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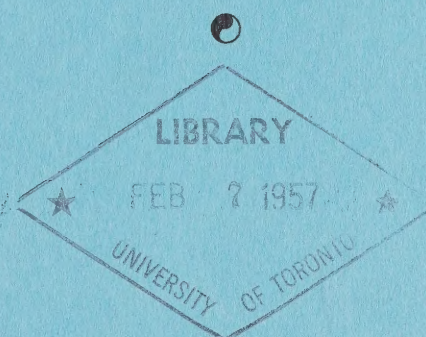
General publications

AN ANALYSIS

CG-15

OF THE

BRICKLAYING TRADE



PREPARED BY

A NATIONAL COMMITTEE

APPOINTED BY

THE DEPARTMENT OF LABOUR

OTTAWA, CANADA

1956

AN ANALYSIS
OF THE
BRICKLAYING TRADE



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AN ANALYSIS OF THE BRICKLAYING TRADE

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COMMITTEE

Chairman: A. B. Thompson

Member: C. H. Stone

Member: J. E. Sullivan

AN ANALYSIS OF THE BRICKLAYING TRADE

INTRODUCTION

The first National Conference on Apprenticeship in Trades and Industries held at Ottawa in May 1952, recommended that the Federal Government be requested to co-operate with Provincial apprenticeship committees and others concerned in preparing analyses of a number of skilled occupations.

In implementing the above recommendation the Training Branch of the Federal Department of Labour appointed a committee of three persons selected by Mr. R. H. MacGuish, Director of Apprenticeship in Nova Scotia to prepare an analysis of the Bricklaying Trade. This committee was organized in December 1955 and included Mr. Charles H. Stone, Contractor in Halifax; Mr. Joseph E. Sullivan, Bricklaying Instructor at the Canadian Vocational Training Centre, Halifax; Mr. A. B. Thompson, Sales Manager, L. E. Shaw Co., Ltd., Brick Manufacturers, Halifax, who acted as committee chairman.

SCOPE OF THE ANALYSIS

Because the practice of this trade varies in certain respects province to province, it was decided that this analysis would set forth only those elements that are considered essential in each and every province. In other words, this would be an analysis such that officials in no province would eliminate any part as being non-essential to the trade. Therefore, it sets forth a body of skills and information common to all sections of Canada. It should be noted that this analysis is not a course of study nor is it intended that operations be undertaken in the sequence shown.

PROCEDURE

This, then, was a starting point and the following steps were taken to make the final result nationally acceptable. As the committee proceeded certain completed portions were sent out to referees in other provinces for examination. The suggestions from these referees were considered and in the light of same the committee reviewed their efforts and finalized the whole body of information in one volume of which this is a part. Therefore, this can be considered the National Analysis of the Bricklaying Trade. As such, it does not preclude the possibility of any province adding certain features so that their apprentices will be familiar with all phases of the trade as practiced in that province.

This analysis comprises a series of Blocks, each of which is a group of related Units. Each unit is made up of a series of operations with appropriate related knowledge indicated. A code system is used by which Block two, Unit one, Operation three and item (a) under Knowledge for example, would be represented by the following, B2, U1, O3, Ka.

AN ANALYSIS OF THE BRICKLAYING TRADE

INTRODUCTION

Such subjects as Mathematics, Science, Blueprint Reading and Safety are included where applicable. Blueprint Reading is intended to include written specifications and other details. References to Safety Regulations refer to Bulletin 2903, Code of Construction Safety measures issued by the National Research Council, Ottawa. Repetitions of a particular skill or piece of information have been avoided as far as possible and when necessary have been referred to by code.

PURPOSE AND USES OF THE ANALYSIS

The Committee recommends this analysis as (1) a guide to foremen and others who train apprentices on the job; (2) a guide to those who instruct apprentices during their in-school periods; (3) the basis of completion examinations for apprentices; (4) a means of transferring apprenticeship credits province to province; (5) a basis for courses of study in vocational schools or trades institutes; (6) a guide as to the nature of instruction on the job; (7) a basis of evaluating previous experience in the qualifying of journeymen.

The committee hopes that this effort will contribute toward the development of nation-wide standards of apprenticeship training and desires to express its appreciation to officials of the Training Branch of the Department of Labour, Ottawa, for their co-operation and to all others whose guidance was most helpful, particularly the referees in each province whose constructive comment and criticism helped immeasurably in the preparation of this analysis.

AN ANALYSIS OF THE BRICKLAYING TRADE

Block 1: Mortars: Various Steps in Preparation

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It is intended that instruction in the proper care and use of all hand tools and other equipment will be given throughout.

AN ANALYSIS OF THE BRICKLAYING TRADE

BLOCK 1: Mortars

UNIT 1: Various steps in preparation

OPERATIONS	KNOWLEDGE
1. Selecting materials:	(a) Specifications and blueprint reading to determine: Types of sand - Pit River or lake Sea Types of lime - Rock (slacked) Hydrated Types of cement - Portland Natural Rapid hardening (b) Origin History Description Availability
2. Screening sand:	(a) Screens for sand. (b) Methods of measuring. (c) Screen to check with screen size specified.
3. Slaking lime:	(a) Pit or box for slaking. (b) Methods of slaking. (c) Calculating volumes and proportions - lime and water. (d) Safe practice.
4. Aging lime:	(a) Reason for aging.
5. Mixing mortar:	(a) Specification to determine mix. (b) Proportions of lime, cement, sand and methods of adding each. (c) Aging before use when specified. (d) Strength, bond, durability, workability, shrinkage. (e) Proportioning by volume and weight.

AN ANALYSIS OF THE BRICKLAYING TRADE

BLOCK 1: Mortars

UNIT 1: Various steps in
preparation

OPERATIONS

KNOWLEDGE

6. Using additives:

- (a) Specification reading to determine types and quantities and when to add in the mixing process.
- (b) Kinds, purpose and limitations in use of additives (liquid and powder)
 - (i) Waterproofing
 - (ii) Coloring
 - (iii) Set Retarding
 - (iv) Set Accelerating
 - (v) Plasticizers
 - (vi) Cold weather protection

7. Using masonry cement:

- (a) Specifications.
- (b) Properties.
- (c) Availability.

8. Using acid resisting
and refractory mortars:

- (a) Specifications.
- (b) Properties.
- (c) Availability.

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8: Making provision to tie-in partitions	
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17: Waterproofing	

AN ANALYSIS OF THE BRICKLAYING TRADE

BLOCK 2: Foundation Walls

UNIT 1: Preparing site and making
building layout

OPERATIONS	KNOWLEDGE
1. Selecting, locating and storing material:	(a) Blueprint reading to determine type of materials and location of work. (b) Effect of weather on materials, and methods of protection. (c) Specifications for and uses of different masonry units. (d) Estimating materials. (e) Safe practice.
2. Preparing mortar:	(a) B1, U1.
3. Establishing base or building line from street line:	(a) Blueprint reading to determine location of building. (b) Knowledge of building code. (c) Use of transit and tapes. (d) Methods of marking.
4. Locating front corner points:	(a) B2, U1, O3, Ka, b, c, d.
5. Squaring corners from building line and measuring side and back lines:	(a) Blueprint reading to locate sides and back of building. (b) B2, U1, O3, Kb, c, d. (c) Use of mason's square. (d) Methods of squaring a building.
6. Checking building levels:	(a) Blueprint reading to determine foundation levels. (b) Use of transit or dumpy level. (c) Purpose of permanent and temporary bench marks.

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BLOCK 2: Foundation Walls

UNIT 2: Procedures and details of construction

OPERATIONS	KNOWLEDGE
1. Positioning mortar and masonry materials:	(a) Moisture content and effect of atmosphere on materials. (b) Estimating materials.
2. Laying-out bond, establishing openings and tying-in partitions:	(a) Blueprint reading to determine location of openings and partitions. (b) Knowledge of different bonds. (c) Use of special units including corners and jambs.
3. Making storey pole or gauge rod:	(a) Selection of wood for pole or rod. (b) Blueprint reading to determine coursing and height of openings. (c) Use of mason's rule. (d) Methods of marking storey pole or gauge rod.
4. Cutting masonry units - (a) Concrete block. (b) Structural tile. (c) Brick.	(a) Use of brick hammer, set or bolster. (b) Use of mechanical masonry saw. (c) Knowledge of electrical power requirements. (d) Safe practice.
5. Building corners and/or leads:	(a) B2, U1, O1, Ka. (b) B1, U1, (Mixing mortar) (c) Use of trowel and correct method of spreading mortar. (d) Use of mason's level or plumb rule. (e) Use of storey pole or gauge rod. (f) Science - levels and plumbs. (g) Bonding of brick.
6. Stretching and sighting line:	(a) Use of line pins, corner line blocks. (b) Use of trig. (c) Use of marked line.
7. Laying masonry units to line - (a) Concrete block. (b) Structural tile. (c) Brick.	(a) B2, U2, O5, Kc, d, e. (b) Methods of jointing. (c) Safe practice.

AN ANALYSIS OF THE BRICKLAYING TRADE

BLOCK 2: Foundation Walls

UNIT 2: Procedures and details of construction

OPERATIONS	KNOWLEDGE
<hr/>	
8. Making provision to tie-in partitions:	(a) Blueprint reading to determine location of partitions. (b) Methods of tying-in or bonding.
9. Placing reinforcing in bed joints:	(a) Blueprint reading to determine type of reinforcing, plain or patented. (b) Science - stresses.
10. Determining sill height for openings other than door openings:	(a) Blueprint reading to determine location and size of openings.
11. Flashing sills:	(a) Methods of flashing. (b) Types of flashing materials.
12. Setting sills:	(a) Blueprint reading to determine type of sills. (b) Methods of spreading mortar for different types of sills. (c) Safe practice and care in handling single unit sills. (d) Trade terminology.
13. Anchoring frames:	(a) Types of anchors and methods.
14. Making concrete lintels:	(a) Blueprint reading to determine type required. (b) Method of reinforcing. (c) Curing time required. (d) Science - forces (bending).
15. Placing lintels - (a) Angle-iron or other steel. (b) Reinforced masonry unit-type. (c) Reinforced concrete type.	(a) Blueprint reading to determine type. (b) Method of bedding. (c) Use of level and setting to line. (d) Trade terminology and specifications for steel shapes.

AN ANALYSIS OF THE BRICKLAYING TRADE

BLOCK 2: Foundation walls

UNIT 2: Procedures and details of
construction

OPERATIONS	KNOWLEDGE
<hr/>	
16. Making masonry bond beam to close-off top of wall:	(a) Blueprint reading to determine type required. (b) Correct method of placing reinforcing.
17. Waterproofing founda- tion walls:	(a) Use of parge, membrane, and patented methods.

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Block 3: Exterior Walls - Miscellaneous details and techniques

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12: Setting cut or artificial stone trim.....	11
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15: Placing nogging between rafters.....	11
16: Cleaning masonry.....	11

AN ANALYSIS OF THE BRICKLAYING TRADE

BLOCK 3: Exterior Walls

UNIT 1: Miscellaneous details and techniques

OPERATIONS	KNOWLEDGE
<hr/>	
1. Selecting materials:	(a) Specification and blueprint reading to determine types of walls and materials. (b) Knowledge of C.S.A. and A.S.T.M. specifications.
2. Preparing mortar:	(a) B1, U1.
3. Building wall and placing flashing if required:	(a) Specification and blueprint reading to determine type of flashing. (b) B2, U2, (complete). (c) Cause and control of efflorescence.
4. Providing weep-holes	(a) Purpose, position, and frequency.
5. Finishing and pointing different joints:	(a) Types of joints and use of correct tools and methods.
6. Building-in rough bucks or steel frames for openings:	(a) Blueprint reading for location. (b) B2, U2, O13, Ka.
7. Erecting scaffolds:	(a) Heights and changes required as work progresses. (b) Various types and means of supporting. (c) Safety regulations.
8. Providing chases or recesses:	(a) Blueprint reading to determine location and size. (b) Purpose of chases and liaison with other trades.
9. Using metal or other ties:	(a) Specification or blueprint reading to determine type. (b) Purpose and location.

AN ANALYSIS OF THE BRICKLAYING TRADE

BLOCK 3: Exterior Walls

UNIT 1: Miscellaneous details and techniques

OPERATIONS

KNOWLEDGE

- | | |
|--|---|
| 10. Building corbels and offsets: | (a) Blueprint reading to determine location and design.
(b) Limit of total extension to wall thickness.
(c) Limit of corbel in inches or fractions of an inch per course. |
| 11. Setting sills, lintels, ornamental stone or terracotta: | (a) B2, U2, O12, Ka, b, c.
(b) B2, U2, O15, Ka, b, c. |
| 12. Setting cut or artificial stone trim -
(a) Quoins.
(b) Bond stones and bond courses.
(c) Capping for pier.
(d) Coping. | (a) Proper methods of cutting, handling, and placing stone.
(b) Use of wooden wedges.
(c) Method of mixing mortar for setting stone.
(d) Safe practices. |
| 13. Positioning and setting of miscellaneous metal work: | (a) Blueprint reading to determine types and location.
(b) Trade terminology. |
| 14. Anchoring roof plate or wall plate: | (a) Use of anchor bolts.
(b) Holding qualities of different types of bolts. |
| 15. Placing nogging between rafters: | (a) When used and purpose. |
| 16. Cleaning masonry: | (a) Specification reading to determine solution to be used and method to be followed.
(b) Method of mixing acid or detergent solutions.
(c) Safety regulations. |

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Block 4: Interior Walls - Construction of Masonry Partitions

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BLOCK 4: Interior Walls

UNIT 1: Construction of Masonry partitions

OPERATIONS

KNOWLEDGE

- | | |
|--|---|
| 1. Laying out work: | (a) Blueprint reading to determine details of walls: location, construction and finish, if any. |
| 2. Preparing mortar: | (a) B1, U1. |
| 3. Bonding into existing work: | (a) Use of ties or anchors.
(b) Essential filling of joints.
(c) Strength of mortar.
(d) Block bonding - indents - toothing. |
| 4. Building firestops: | (a) Blueprint reading to determine where necessary.
(b) Building code. |
| 5. Building-in rough bucks or steel frames: | (a) B2, U2, O13, Ka. |
| 6. Building-in nailing strips, plugs, and metal furring clips: | (a) Blueprint reading to determine type and location.
(b) Holding qualities of nailing strips, furring clips, etc. |
| 7. Building walls faced on both sides: | (a) Using two units plumbed on each face of wall. |
| 8. Building-in conduit and miscellaneous metal work: | (a) Blueprint reading to determine location and type. |
| 9. Cutting masonry units for interior work: | (a) Use of masonry saw.
(b) Care in handling units for decorative work.
(c) Use of mason's rule. |
| 10. Building walls of plain or glazed facing tile: | (a) Blueprint reading to determine location and type.
(b) Use of masonry saw.
(c) Use of special shapes. |

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Block 5: Chimneys and Flues - Specifications and Construction Procedures

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BLOCK 5: Chimneys and Flues

UNIT 1: Specifications and Construction Procedures

OPERATIONS

KNOWLEDGE

- | | |
|---|--|
| 1. Laying out work: | (a) Blueprint reading to determine location and specifications.
(b) Use of mason's rule.
(c) Use and knowledge of building code.
(d) Knowledge of flue capacities and efficiency. |
| 2. Building abutments: | (a) Use of concrete block or brick.
(b) Design to carry fireplace above.
(c) Corbelling to carry fireplace hearth. |
| 3. Miscellaneous ironwork -
(a) Cleanouts.
(b) Breechings.
(c) Thimbles. | (a) Types and location.
(b) Correct method of anchoring. |
| 4. Building in flue-
linings: | (a) Vitrified clay flue-lining.
(b) Bedding, jointing.
(c) Firebrick.
(d) Building code. |
| 5. Building withes or
midfeathers: | (a) Building code.
(b) Tying or bonding masonry work effectively in chimney. |
| 6. Placing flashings: | (a) Purpose of flashings.
(b) Types of materials used for flashing.
(c) Various details and methods of applying. |
| 7. Constructing offset
flues: | (a) Mathematics; angles to perpendicular.
(b) Building code. |
| 8. Corbelling to increase
chimney size: | (a) B3, U1, O10, kb, c. |
| 9. Topping-out chimney: | (a) Mortar specifications for meeting more rigorous conditions.
(b) Methods and types. |

AN ANALYSIS OF THE BRICKLAYING TRADE

BLOCK 5: Chimneys and Flues

UNIT 1: Specifications and Construction
Procedures

OPERATIONS

KNOWLEDGE

- | | |
|--|--|
| 10. Setting chimney tops: | (a) Types of chimney tops and their purpose.
(b) Same must be centred and plumb.
(c) Benching mortars. |
| 11. Building with
refractory units: | (a) Blueprint reading to determine location
and types.
(b) B1, U1, O8, ka, b, c.
(c) Use of special shapes. |

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BLOCK 8: Finished Fireplaces

UNIT 1: Details of Design & Construction

OPERATIONS

KNOWLEDGE

- | | |
|--|--|
| 1. Laying out work: | (a) Blueprint reading to determine location and design.
(b) Building code. |
| 2. Placing ash dump, building fireback and setting damper: | (a) Use of firebrick for back hearth.
(b) Cutting firebrick.
(c) Use of fireclay or high temperature cement.
(d) Relating the following to width of finished opening -
1. Height of finished opening.
2. Depth of backhearth.
3. Width of back of fireback.
4. Vertical height of fireback.
5. Sloping height of fireback.
6. Width and height of throat.
7. Width of smoke shelf.
8. Size of damper required.
9. Height at which damper is placed.
10. Location of ash dump. |
| 3. Building-in steel fire-place form: | (a) Types and methods of installing. |
| 4. Building masonry mantel: | (a) Very careful selection of units for quality.
(b) Care in anchoring to rough brickwork. |

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Block 7: Miscellaneous Masonry

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3: Building glass panels	

AN ANALYSIS OF THE BRICKLAYING TRADE

BLOCK 7: Miscellaneous Masonry

UNIT 1: Buttresses and Pilasters

OPERATIONS

KNOWLEDGE

1. Laying out work:

- (a) Blueprint reading to determine type.
- (b) Purpose of buttress or pilaster for additional strength or architectural effect.
- (c) Buttress types:
 - 1. Vertical.
 - 2. Battered.
 - 3. Flying.
 - 4. Corner.
- (d) Pilaster types:
 - 1. One side of wall.
 - 2. Two sides of wall.
 - 3. Corner.

2. Building buttress or pilaster:

- (a) Using adjustable plumb-rule or batter-stick.
- (b) Angles.
- (c) Stress and strength of materials.

AN ANALYSIS OF THE BRICKLAYING TRADE

BLOCK 7: Miscellaneous Masonry

UNIT 2: Steps, Walks and Patios

OPERATIONS

KNOWLEDGE

1. Laying out work:

- (a) Materials and patterns.
- (b) Bonds.
- (c) Cutting for such types as Herring Bone.

2. Building steps, walks
and patios:

- (a) Special mortar required because of unusual exposure to weather.
- (b) Foundations.
- (c) Use of level.
- (d) Determining grades.
- (e) Determining rise and tread.
- (f) Building code requirements.

AN ANALYSIS OF THE BRICKLAYING TRADE

BLOCK 7: Miscellaneous Masonry

UNIT 3: Decorative Masonry

OPERATIONS

KNOWLEDGE

- | | |
|---|---|
| 1. Building decorative masonry: | (a) Bonds.
(b) Patterns.
(c) Blending colors.
(d) Combining different units in one wall.
(e) Jointing. |
| 2. Using coloured mortars: | (a) Determining correct additives and right proportions to use.
(b) Correct method of mixing. |
| 3. Building glass block panels -
(a) Placing reinforcing.
(b) Placing expansion strip.
(c) Installing louvres and ventilators.
(d) Jointing and cleaning. | (a) Size of openings.
(b) Size of blocks.
(c) Patterns of block and correct way to lay them.
(d) Mortar.
(e) Use of reinforcing and expansion strip, also weather-seals and their purpose.
(f) Limitations in use. |

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Block 8: Reinforced Masonry - Purposes and Design

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BLOCK 8: Reinforced Masonry

UNIT 1: Purposes and Design

OPERATIONS	KNOWLEDGE
<hr/>	
1. Placing steel:	(a) Specification and blueprint reading to determine design and placing of steel. (b) Cutting reinforcing steel and wiring into position.
2. Laying brick or tile:	(a) Determining joint thickness to ensure proper bonding and coverage of steel in grouting process.
3. Grouting wall:	(a) Mixing grout. (b) Limitations of flow of grout.

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Block 9: Arches - Design and Construction Procedures

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BLOCK 9: Arches

UNIT 1: Design and Construction Procedures

OPERATIONS

KNOWLEDGE

- | | |
|--|---|
| 1. Laying-out work: | (a) Blueprint reading to determine type and location.
(b) Various designs of arches.
(c) Mathematics: Geometry of the circle and ellipse. |
| 2. Setting and removing centres: | (a) Use of plumb-rule and level.
(b) Use of folding wedges to ensure quick and easy removal without disturbing green brickwork.
(c) Considerations in the construction, placing and removal of centres. |
| 3. Determining spring line and cutting skewback: | (a) B2, U2, O4, Ka, b.
(b) Safe practices. |
| 4. Laying-up arch: | (a) Use of centre point (or points) to line up joints.
(b) Necessity of tapering each brick or stone to gain uniform thickness of joints.
(c) Use of trammel. |

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Block 10: Pointing and Renovating - Operations Involved in Repair Work

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BLOCK 10: Pointing and Renovating
Existing Work

UNIT 1: Operations Involved in
Repair Work

OPERATIONS	KNOWLEDGE
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1. Cutting out defective joints and sections of masonry units:	(a) Methods of inspecting work to determine sections to be repaired. (b) Specifications to determine depth of wragging and type of mortar. (c) Use of portable-type saw with abrasive blade. Safety precautions. (d) Use of wragging chisel and mash hammer.
2. Cleaning out and wetting:	(a) Purpose of wetting.
3. Placing new masonry units:	(a) Maintenance of original bond and pattern. (b) Matching old work.
4. Filling joints and pointing:	(a) Type of mortar and joints. (b) Types and use of pointing tools.
5. Shoring and needling:	(a) Strength of materials. (b) Methods of placing and fastening. (c) Distance on centres. (d) Use of jacks and wedges. (e) Effects of vibration. (f) Safety code.

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QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1957